Case II
Volatility Models and Resulting Diffusion Processes

You have $1 million invested in a stock of your choosing. You will use CRSP to collect the last available 500 days of returns (and the last closing price) on your stock and use that to complete the following requirements:

Using Excel:

1- Assuming EWMA for the volatility:
   a. Find the optimal Lambda.
   b. Forecast the stock's daily volatility for the next 10 days and the total volatility over the 10-day period.

2- Assuming GARCH for the volatility:
   a. Find the optimal Omega, Alpha and Beta.
   b. Forecast the stock's daily volatility for the next 10 days and the total volatility over the 10-day period.

3- Calculate the 99% and 95% daily VaR (on first day after last observation) of your holding in the stock under the assumption of normality of returns with zero mean but with the volatility determined using each of the three methods, simple historical, EWMA implied and GARCH implied volatility.

Using Crystal Ball:

4- Model the stock's diffusion process over the next 10 days using GBM with a daily average return of 0 and a daily volatility equal to the historical volatility using (Use 10,000 iterations per simulation):
   a. One jump over the 10-day period and report the resulting forecast graph and statistics for the result as well as the 99% VaR
   b. 10 daily jumps over the 10-day period and report the resulting forecast graph and statistics for the result as well as the 99% VaR

5- Repeat requirements 3a and 3b but under the following assumptions:
   a. The stock's volatility follows EWMA as modeled in requirement 1.
   b. The stock's volatility follows GARCH as modeled in requirement 2.

Notes

1. Submit one Excel workbook – UPLOAD IT TO BB - use as many sheets as you need but make sure to label them properly. Make sure the names of your group members are listed on the cover sheet.
2. The response to each requirement should be clearly presented.

Grading Rubric

Dimension	Possible points	Sample Issues
completeness/ accuracy / correctness	16	• Are all requirements of the project satisfied? • Are the calculations correct?
presentation/ clarity / annotations	3	• Is there clarity in the presentation? • Is the presentation streamlined and easy to follow? • Is the presentation "business professional"?
wow factor (innovation and creativity)	1	• Does this workbook represent creative or innovative applications in Excel? • Did the preparer "go the extra mile?"
TOTAL	**20**	